

NATURAL HISTORY NOTES ON THE ATLANTIC
LOGGERHEAD TURTLE, *CARETTA CARETTA CARETTA*

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During a general study of the Atlantic forms of American sea turtles,¹ centered chiefly upon the Atlantic Green turtle, *Chelonia mydas mydas* (Linnaeus), and the Atlantic Ridley, *Lepidochelys kempi* (Garman), a number of notes on the Atlantic Loggerhead turtle, *Caretta caretta caretta* (Linnaeus), have accumulated. While sketchy and inconclusive, they nevertheless add something to our remarkably incomplete knowledge of an animal that is familiar to most of the inhabitants of the Gulf coast and the southern Atlantic seaboard.

Thirty-seven loggerheads were marked during the summers of 1953, 1954, and 1955. All were females, taken when they came out to lay. Two kinds of inscribed tags were used. The earlier was a 1-inch circular monel metal disk, the later version an approximately 2- by 1½-inch oval. In each case the tag bore a number and was inscribed, in Spanish and English, with instructions for its return. Most of the work was done on the east coast of Florida (Figure 1) from Fort Pierce (Indian River Inlet) south to Jupiter Inlet, a distance of about 40 miles. Some turtles were tagged at Cocoa Beach near Cape Canaveral and at Daytona Beach. A single individual was tagged on St. Vincents Island, near Apalachicola, Franklin County, Florida (northern coast of the Gulf of Mexico, not shown on Figure 1) in 1955.

Of the marked turtles only one has been retaken. This, unfortunately, was an individual tagged by a student from the University of Florida who volunteered to help with the tagging program and then failed to turn over his notes to us when he was drafted into military service. We know only that the tag was put on late in June, 1955, at Fort Pierce. It was recovered when the turtle was retaken July 15, 1955, by a shrimp trawler off Daytona Beach. The shoreline distance traveled by the turtle was about 130 miles (Figure 1).

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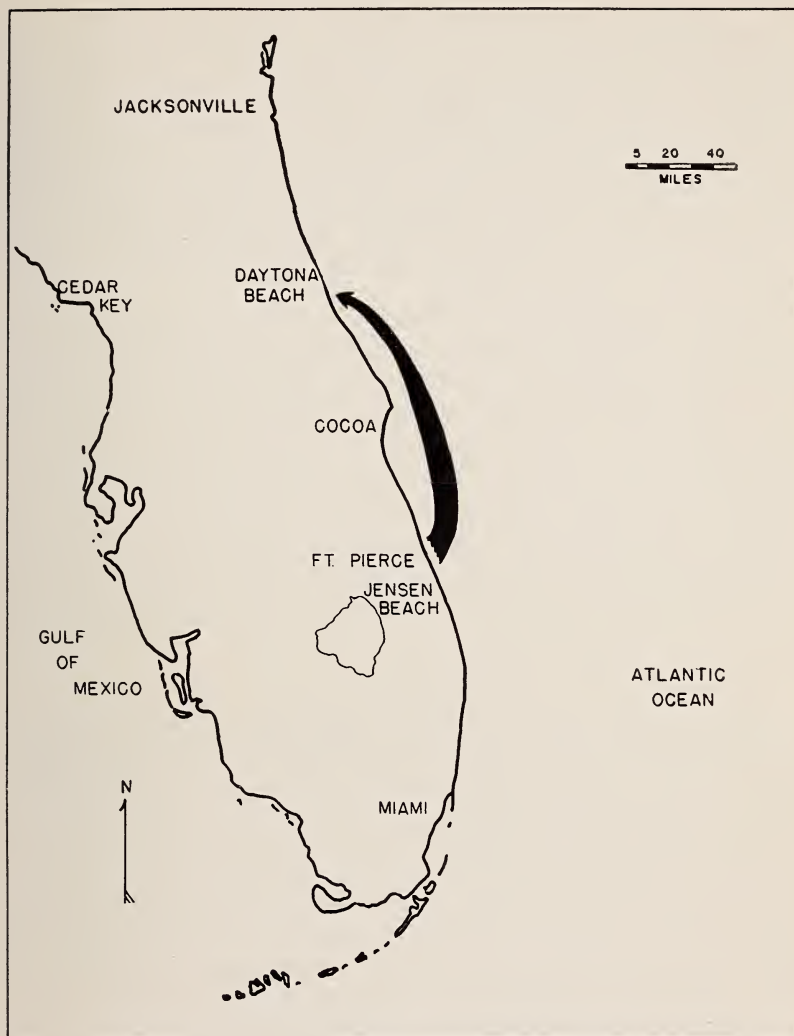


Figure 1. Map of peninsular Florida showing the areas where nesting female loggerheads were tagged during the summers of 1953, 1954, and 1955. The approximate path taken by a tagged individual before recovery is also shown.

NESTING BEHAVIOR

An interesting and unexplained aspect of the group behavior of sea turtles on a nesting beach is the tendency for emergences to clump, in time or about particular sections of beaches. Such a tendency has been noted at the green turtle rookery in Costa Rica, and notes made there during the summer of 1955 will be discussed elsewhere (Carr and Giovannoli, Ms.). Observations possibly bear upon this tendency in the loggerhead were made by Caldwell and Hellier on July 22-23, 1955, at Hutchinsons Island, opposite Jensen Beach, Martin County, Florida:

Nesting loggerheads were extremely common on this beach on the night of the 22nd. Seven and a half miles of beach were patrolled with a jeep, and this distance was covered twice. The evening was clear with little wind, the moon dark, weather warm, and the tide had just turned from flood to ebb, though the water was still fairly high during the 3½ hours spent on the beach. Nine turtles were tagged, another seen, and the fresh tracks of at least 25 others were observed. From our past experience on the beach and from conversations with Mr. Newt Chase, the local officer of the Florida State Board of Conservation, who had been on the beach every night during the season, this seemed, and still seems an exceptionally heavy emergence.

The next night we spent about the same time on the same stretch of beach at the same stage of the tide (thus, somewhat later in the evening) and saw only one fresh crawl and no turtles other than the one to be commented on below. Though Mr. Chase did not accompany us, we saw him during the evening and found that he had not seen any turtles or tracks except that one seen by us, and it might be added that he had covered an even longer stretch of beach than we had. Weather conditions were identical with those of the previous night with the one exception that there had been a high wind during the latter part of the previous night (after we left the beach) which had continued throughout the day, and partly into the second night. Perhaps as a result of this, there was a strong undertow and a heavy surf during the day and on the night of the 23rd. There had been practically no surf on the first night and conversation with the lifeguard on a part of the beach maintained by the county as a park proved that there had also been no undertow during the first day (the 22nd). The under-

tow had cut away a portion of the beach so that there was a definite step or low bluff (up to 12 inches) about midway between high and low water lines. This step was not present the night of the 22nd, nor did we remember its presence on any previous visit to the beach when turtles had been relatively plentiful. Just as we were about to give up on this second night we glimpsed a turtle emerging from the surf. We immediately turned off all lights and waited for her to come out. She continued to move up the beach until she came to the step, which was now about 30 feet from the water's edge. On encountering the rise she unhesitatingly turned and went back to the water. After she had gone, we examined her path and found that she had made no serious effort to get over the step obstruction which was about 8 inches high at this point. A further walk of $\frac{1}{2}$ mile revealed no more tracks or turtles.

Though the above data are scanty, it seems probable that the undertow (or related factors) and the step, when the water lowered enough for it to become a barrier, combined to discourage nesting that second night. The possible deterrent effect of steep-cut banks, and their relation to the Caribbean cocopalms fringe, is discussed by Carr (1956: 114-115, 122).

CUBAN NESTING RECORDS

There is apparently a dearth of reliable nesting records for the Atlantic loggerhead for localities outside the southern United States.

On November 16, 1954, two of us (Caldwell and Carr), while visiting the Marine Laboratory of the Banco de Fomento Agricola e Industrial de Cuba at Playa Baracoa, 15 miles west of Havana on the north shore of Cuba, were presented with two live baby loggerheads which had been taken a few weeks before, after hatching on the beach near the laboratory. These were preserved and are now in the University of Florida herpetology collection (UF 6817).

Other Cuban nesting records were established in the summer of 1955 when one of us (Carr) found shells of eight individuals along two miles of Varadero beach (Atlantic coast, province of Matanzas). Tracks and disturbed nests indicated that the shells were the remains of females that had been killed and butchered where found nesting.

Farther east on the Atlantic side of the island at Gibara, there is a commercial hawksbill, *Eretmochelys imbricata imbricata* (Linnaeus), fishery, and individuals connected with this stated that while hawksbills nest in abundance there in May, June, and July, loggerheads emerge only rarely.

As far as can be determined, the Playa Baracoa record is the southernmost definite nesting locality for the Atlantic loggerhead in America. Fishermen and turtle hunters questioned by Carr at points distributed throughout the Caribbean know the loggerhead as a member of the fauna, but in every case they name either the hawksbill or the green turtle, or both, as the only species regularly nesting in their area. In Trinidad and Tobago all fishermen questioned said flatly that loggerheads do not nest there. Elsewhere, nesting was said to occur sparingly—one or two emergences in a season. The nearest approach to a definite record is the statement by one of the men hired for the green turtle operation at Tortuguero, Costa Rica, that a loggerhead had come up on his section of beach during late July, 1955. Since he had been employed to turn only green turtles, he failed to turn the loggerhead.

Whatever the extremes of nesting range of the loggerhead may be, it seems evident that it is essentially a temperate zone breeder. The possible evolutionary implications of this divergence from other sea turtle species at the critical nesting time, when on good beaches nesting space can become the basis for strong competition, are of interest and probably of significance.

INCUBATION PERIODS

Although hatched under somewhat unnatural conditions, we have accurate incubation periods for two batches of loggerhead eggs to add to the scant data in the literature. In both cases, the eggs were taken as they were laid, moved to a spot where they could be watched conveniently, and reburied in the same type of sand in which they had been originally laid.

One batch was laid July 9, 1955, at Fort Walton Beach, on Santa Rosa Island, Okaloosa County, Florida and then reburied, two days later, back of the open beach near the second series of dunes. Most of these hatched on September 7, after an incubation period of 57 days.

The second batch was taken on July 22, 1955, at Hutchinsons Island, was transported in sand back to Gainesville, along with a supply of beach sand, and was reburied in a sunny yard there on July 25. These hatched September 30—an incubation period of 68 days. Only about one-third of these eggs hatched, possibly due to jolting on the trip back or to unnatural drainage or illumination factors in the new incubation site.

GROWTH OF HATCHLINGS

Two hatchling loggerheads were kept under artificial and somewhat confining conditions for a short period, during which they fed regularly. Measurements of the growth of these are presented in Table 1. Another group of young turtles (Table 2) was measured and weighed at the Gulfarium, The Living Sea, at Fort Walton Beach. Although no exact record had been kept of the ages of the turtles, and individuals from several hatchings were in the same tank, the 48 mm individual was measured about 2 weeks after hatching; those 53 to 71 mm were approximately 11 weeks old; and the one 81 mm was about 13 weeks. Since none of the turtles were marked, on being placed in the community tank, we cannot be certain that an occasional individual was not added to the group from a still different hatching; but the resident aquarists, J. B. Siebenaler and Winfield Brady, believe the above approximate ages to be essentially correct.

There is apparently a considerable variation in growth rates of individual young loggerheads (also noted by Hildebrand and Hatsel, 1927, and Parker, 1926, 1929), since most, if not all, of the 53 to 71 mm group above were from the one hatching of September 7 (see section on incubation periods). As may be seen in Tables 1 and 2, growth is quite slow for the first ten days or so and little weight is gained. This is undoubtedly due to the absorption of the yolk and accompanying fasting of the hatchling. After the hatchlings begin to eat regularly, a marked rise in rate of increase in length and weight occurs.

While it is probable that our captive hatchlings received an unnaturally steady and abundant food supply, other factors possibly tending to make theirs an unnatural growth, such as the confinement factor, the unvarying temperature, lack of "choice" in feeding, etc., are difficult to evaluate. So long as young sea turtles

continue to disappear from view after hatching, however, it is hard to see how early growth can be studied under more natural conditions.

TABLE 1

Growth of two juvenile loggerhead turtles hatched at Fort Walton Beach, Florida on September 7, 1955, and kept in captivity.

Age (days)	Carapace Length (mm)	Carapace Width (mm)	Weight (gms)
Specimen A			
7	46	38	17.8
8	46	38	18.3
9	46+	38+	19.0
10	46.5	39	19.9
11	47	40.5	20.1
12	47.5	41	19.7
13	47.5	—	20.2
14	48.5	—	21.3
16	49.5	—	22.7
27	49.5	—	23.1
20	50.5	—	24.5
Specimen B			
7	46	37	18.8
8	46	37	19.7
9	46+	37.5	19.7
10	46.5	38+	20.5
11	46.5+	38+	21.1
12	47	42	21.1
13	48	—	21.8
14	48.5	—	22.6
16	49+	—	23.6
17	49.5	—	23.3
20	50.5	—	25.5

RELATIONSHIP OF CARAPACE LENGTH TO CARAPACE WIDTH

Though we have only a small sample, some idea of the variation in the length-width relationship of the carapace of adult female loggerheads can be gained from Figure 2. Unfortunately, no comparable measurements are available for adult males. Carr (1952: 386) noted that adult males appear narrower than the females, or at least the carapace appears to be more elongate and tapering behind than in females. Unsexed hatchlings or slightly larger loggerheads exhibit only a slight variation in this relationship (Table

2) and the variation shown in the larger sized turtles must be a dual function of age within a sex and of difference between the sexes themselves.

TABLE 2
Measurements of loggerhead hatchlings and very young

Carapace Length (mm)	Carapace Width (mm)		Weight (gms)		Number of Specimens
	Mean	Range	Mean	Range	
Hatchlings (Eggs from Hutchinsons Island, Florida)					
44 -----	35	34-35	18.4	17.4-19.4	3
45 -----	35	34-36	17.4	17.1-17.7	2
46 -----	35	-----	19.6	-----	1
47 -----	36	35-37	18.9	18.8-18.9	2
Very young (Eggs from Santa Rosa Island, Florida) kept in captivity					
48 -----	40	-----	20.1	-----	1
53 -----	44	43-45	25.7	23.9-27.9	3
54 -----	45	44-46	27.4	24.2-29.0	5
55 -----	47	-----	32.9	-----	1
56 -----	47	46-48	29.7	28.0-31.3	3
57 -----	49	48-50	32.2	31.2-34.2	3
58 -----	50	49-50	33.2	31.2-35.1	2
59 -----	50	49-51	36.0	34.0-38.5	4
60 -----	51	49-52	38.4	36.2-40.8	4
61 -----	52	51-54	39.3	38.2-40.7	3
62 -----	53	52-53	41.3	40.4-42.2	2
63 -----	54	53-56	42.9	40.1-44.6	7
64 -----	54	-----	45.7	-----	1
65 -----	56	-----	44.6	-----	1
66 -----	55	-----	52.0	-----	1
67 -----	58	57-58	48.7	48.3-49.1	2
68 -----	60	-----	54.6	-----	1
69 -----	61	-----	55.4	-----	1
70 -----	60	59-60	60.3	59.9-60.6	2
71 -----	57	-----	63.9	-----	1
81 -----	68	-----	95.8	-----	1

Carr and Caldwell (1956) showed that variation in the length-width ratio in Atlantic Green turtles and Atlantic Ridleys, while interesting in itself, is also an important factor in determining the relationship of length to weight in turtles of commercial size. This can be important in making decisions or recommendations in fishery work since two individuals of the same sex and length, but of different widths, may have greatly varying weights.

LENGTH-WEIGHT RELATIONSHIP OF HATCHLINGS AND VERY YOUNG

Though we have no weights for adults, we do have accurate data on the weights and carapace lengths of hatchlings and slightly older juveniles, the latter having been maintained in captivity since hatching. These data are presented in Tables 1 and 2.

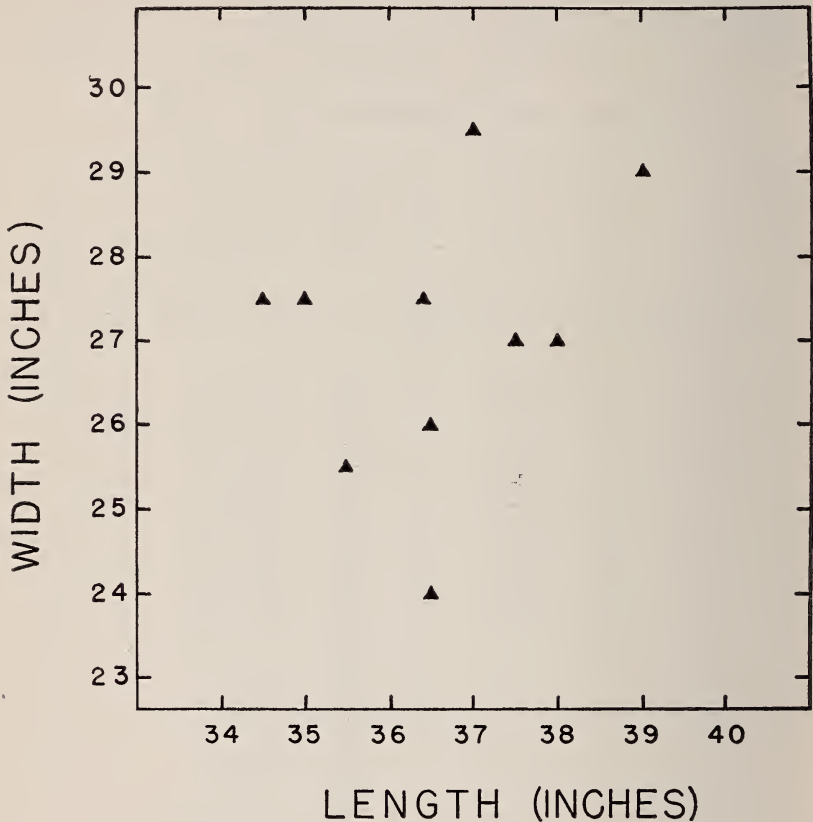


Figure 2. Relationship of carapace length to carapace width in nesting female loggerheads from Hutchinsons Island, Florida.

RANGE-HABITAT

One of the important gaps in the knowledge of sea turtles is a lack of understanding of the range-habitat complex of the several species. In the case of the loggerhead, we know that (1) its breeding range has the greatest northern and least tropical extent of

any of the species and (2) that the non-breeding adults range widely, as solitary individuals (and perhaps peripherally as waifs and strays) throughout the warm and temperate seas of the world. The mainly carnivorous, largely crab-eating, but somewhat omnivorous, habit makes for relatively unrestricted habitat relations, and the willingness to accept nearly any invertebrate food would seem to allow a range extension to limits set naturally only by cold water.

One observation pertinent in this connection was contributed by Dr. E. Lowe Pierce of the Department of Biology, University of Florida. He has noted that in searching for the submerged rocks where he fishes in the Gulf of Mexico at Cedar Key, the blowing of a loggerhead often marks the site of a submerged outcrop. The more tropical elements in the fauna group about these rocks and the communities there presumably include aggregations of crustaceans attractive to the loggerheads. It is of interest that when no loggerheads show up, Dr. Pierce can often locate the 3 to 6 fathom rock bottom by the crackling sound of snapping shrimp under his boat.

Another significant note is that of aqua-lung divers in the Panama City-Pensacola, Florida area who have repeatedly observed loggerheads poking about the old wrecks around which they do their spear fishing and some of which are under as much as a hundred feet of water.

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